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5/24/01

Health Consultation No. 8

Copy to Ken Lapham, EPA
7/30/01 Omaha

(Past Exposure to Contaminated Groundwater, Surface,
Soil, Sediment, and Air and Answers to Community Questions)

PRECISION NATIONAL CORPORATION
(a/k/a PRECISION NATIONAL PLATING SERVICES, INCORPORATED)

CLARKS-SUMMIT, LACKAWANNA COUNTY, PENNSYLVANIA

EPA FACILITY ID: PAD053676631

APRIL 27, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

This document has previously been released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The health consultation has now been reissued. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION NO. 8

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Soil, Sediment, and Air and Answers to Community Questions)

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EPA FACILITY ID: PAD053676631

Prepared by:

Pennsylvania Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

SUMMARY

At the request of the community near the Precision National Plating Services site (PNPS), the Pennsylvania Department of Health (PADOH), working under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared this Health Consultation (HC) to evaluate historic soil, sediment, surface water, and private residential well sampling results for wells near the site along Arch Avenue and within a 1-mile radius of the site to determine if chromium and other contaminants were historically present in these media at levels that could have harmed people's health. This HC also comments on limited air data and its significance and utility in estimating a potential past health threat from this medium.

At the request of the community, we also address site-specific questions posed by the community and evaluate cancer mortality, cancer incidence, and other available health outcome data to determine if elevated morbidity or mortality is present in residential areas near the site. The strengths and limitations of the data as well as our findings are discussed in this HC.

PADOH and ATSDR conclude that:

- past exposure to contaminated private well water, soil, sediment, and surface water in the Murphy Seep and in the Ackerly Creek did not threaten the health of people who came in contact with these media.

- routine historic exposure to surface water from any of the seeps on a nearby restaurant property was unlikely and therefore did not represent a past public health threat.

- exposure to soils on the golf course greens at the nearby Glen Oak Country Club do not pose a health threat to golfers, maintenance workers, or others using this facility.

- based on the available data and two potential surface water exposure scenarios, past exposures to hexavalent chromium in the cinderblock seep are not expected to have resulted in current adverse health effects.

- because of limited historic information we cannot conclusively state that health effects did not occur from past exposure to airborne contaminants. However, based on the rapid dilution of hexavalent chromium as it was transported through air, and review of available health outcome information, we suspect that this exposure did not harm the health of nearby residents and we classify the exposure pathway as no apparent public health hazard.

- we are unable to determine if residents near the site experienced an increase in miscarriages and birth defects due to health outcome data limitations. However, based on known concentrations of contaminants in private well water, it is unlikely that these

chemicals were responsible for any increase rate of miscarriages in the community near the site.

- the number of cancer deaths in the population near the site is not abnormally elevated and the deaths occurred in age groups in which the types of cancers observed are common.

Conclusions and recommendations regarding the PNPS are based on data currently available, are specific to this site, and do not apply to any other site in Pennsylvania. Additional data could alter the conclusions and recommendations being presented.

BACKGROUND AND STATEMENT OF ISSUES

Site History

Precision National Plating Services (PNPS) owns a chromium plating facility (the Site) at 198 Ackerly Road, approximately 0.75 miles north of Clarks Summit, Pennsylvania (Figures 1 & 2). The 46-acre property is located in a rural area and has operated as a plating facility since 1956. Ernest V. Berry, Inc. began operations at the site in 1956 for the chrome plating and machining of locomotive crankshafts. Precision National Corporation (later called Precision National Plating Services Corporation) acquired ownership of the facility in 1971, and limited operations to reconditioning various engine components for the railroad, marine and power industries. The reconditioning process utilized trivalent and hexavalent chromium to apply a protective and wear-reducing coating. In 1975, Precision added a cylinder-lining division, which closed in 1997.

From 1956 through 1970, chromium liquid wastes were disposed of in an unlined lagoon north of the plant building. In May of 1970, as a result of a breach in the lagoon, liquid wastes from this lagoon were unintentionally discharged to a drainage swale along Ackerly Road. The discharged waste water flowed downgradient through the drainage swale to Ackerly Creek. When Precision acquired the facility in 1971, the lagoon was no longer used to dispose of liquid wastes generated by the plant. In 1971, under the supervision of the Pennsylvania Department of Environmental Resources, now known as the Pennsylvania Department of Environmental Protection (PADEP), Precision drained and back-filled the lagoon area. The facility ceased operations in 1999. Historical data indicate that hexavalent chromium has migrated off the Site in groundwater and has contaminated residential wells and seeps near the site [1-8].

From 1956 to 1970, wastewater discharged to a tile field which emptied into an unlined lagoon. The continued discharge to this lagoon likely provided an almost constant and significant source of contamination to the underlying soils and groundwater. The time for the chromium wastewater to migrate from the base of the lagoon and reach groundwater, and the time necessary for this plume to travel through the fractured bedrock to the downgradient residents, are not exactly known. However, given the prominent bedrock jointing visible in local outcrops,

a relatively thin soil cover, and the shallowness of chromium contamination, a contaminant plume probably formed in a matter of weeks or at most within several months after discharge to the lagoon began [9]. This approximation is based upon research in similar geology (fractured sandstone and shale) in western Pennsylvania [10].

The site is in a mountainous region of northeastern Pennsylvania at an elevation of approximately 1,190 feet above mean sea level (amsl). A topographic high of 1,240 feet amsl is approximately 400 feet south of the facility. Based on topographic data, the direction of surface drainage at the site is to the north-northwest (downhill) at a gradient of approximately 660 feet per mile. The surrounding area is drained by Ackerly Creek, which flows generally from northeast to southwest toward Glenburn Pond [1]. Topography and groundwater flow direction are identified in Figure 3 [2].

PADOH and ATSDR have been actively addressing community concerns by determining the public health significance of residential exposure to site-related hexavalent chromium in off-site media since October 1997 and have published a series of HCs to address these issues [1-7]. These HCs addressed current exposure to hexavalent chromium in private well water, surface water, sediments and soil.

The community near the site also expressed concern that they may have been historically exposed to chromium or other contaminants from the site and desired to have their past exposures evaluated. This HC evaluates existing information to determine if residents near the Site have been exposed to chromium and other contaminants from the site at levels that could have harmed their health. In preparing this HC, PADOH and ATSDR rely on the information provided in the reference documents and input from the community.

STATE AND FEDERAL COMMUNITY INVOLVEMENT

PADOH became aware of health concerns among community members during an initial site visit to the PNPS in November 1997. PADOH and ATSDR met with residents in their homes later that month to gather their health concerns. The majority of their questions focused on concern that exposure to hexavalent chromium from the site might harm the health of nearby residents.

In cooperation with ATSDR, PADOH subsequently prepared a series of Health Consultations to address community concern. PADOH and ATSDR concluded that community members are not currently being exposed to chromium contamination from the site at levels of health concern either through contaminated groundwater, soil, air, or surface water (seeps).

Health professional education materials were made available to over 300 local physicians via the Lackawanna County Medical Society. The society published an article discussing our site-related activities and available environmental health resources in the Spring 1998 medical society newsletter. Resources were provided to individual physicians upon request.

In September 1998, an ATSDR physician trained in environmental medicine accompanied PADOH and other ATSDR staff in conducting a follow-up visit to the interested community members and answered questions regarding historical residential exposure to chromium in private well water. Community members were informed that, based on available data, past exposure to chromium in private residential wells located near the site was not expected to cause adverse health effects. Health education materials and resources were provided to residents during these meetings. Residents were provided with information on private clinics certified through the Association of Occupational and Environmental Clinics (AOEC) and medical care was recommended through these clinics if additional expertise in environmental medicine was desired.

In May 1999, PADOH and ATSDR met with interested residents who attended a United States Environmental Protection Agency's (USEPA) Public Availability Session (PAS) on the site. In April 2000, we again met with interested residents and local township officials during a Public Availability Meeting to address further questions raised in the community. Approximately 65 community members and 20 federal, state, local representatives, and media attended this meeting. Fact Sheets were distributed to community members at public meetings and directly through the mail.

On June 19, 2000, ATSDR and PADOH staff provided an update to community members attending the local township supervisors' meeting. Also in June 2000, in response to a request from the community during the April PAS, ATSDR offered to arrange for a second medical opinion from experts in environmental health medicine for a select group of residents. This group of community members consisted of residents with health concerns who lived close to the site and had their hair analyzed for chemicals they believed were in their bodies from past exposure to site-related environmental contamination. Should any of these residents take advantage of this opportunity, the exams will be conducted by physicians trained in environmental medicine and practice at an Association of Occupational and Environmental Clinic [11].

This document was released for public comment from September 7, 2000 through October 24, 2000 and includes our responses to the comments we received.

SITE VISITS

Numerous site visits have been made by PADOH and ATSDR, from 1997 to the present, during the ongoing investigation of this site [1-7]. Our most recent site visit occurred on July 12, 2000. The primary purpose of our visit was to respond to community concern by collecting surface soil samples on the grounds of the golf course at the Glen Oak Country Club. The results of our analysis and evaluation are addressed in the Discussion Section of this HC.

CHILD HEALTH INITIATIVE

ATSDR and PADOH recognize that infants and children may be more sensitive to environmental exposure than adults in communities faced with contamination of their water, soils, sediments, or air. This sensitivity is a result of the following factors: (1) children are more likely to be exposed to certain media (e.g., soil, sediment, air, surface water or water from springs) because they play outdoors; (2) children are shorter than adults, which means they can breathe dust, soil, and vapors close to the ground; and (3) children are smaller, therefore childhood exposure results in higher doses of chemicals per body weight. Children can sustain permanent damage if these factors lead to toxic exposure during critical growth stages.

During our evaluation of potential historical exposure, one resident informed PADOH that she and a neighborhood boy were the "outdoor type" and they both drank from the seeps at least 2 times per day and up to 7 times per day 7 days a week [12]. Our health evaluation of this past exposure to surface water at the seeps is based on her statement. Based on this report, the two children who were said to have aggressively drunk from the Cinderblock seep may have experienced acute mild transient, gastrointestinal irritation and discomfort that would have stopped when exposure ceased. PADOH and ATSDR did not identify any situations where children were likely to have been exposed to contaminants at levels that would have been associated with current adverse health conditions.

DISCUSSION

The sampling data evaluated in this section were obtained from the Arcadis Geraghty & Miller Analytical Database Release 2.0 [13]. This database summarizes analytical results from groundwater, soil, sediment, surface water environmental samples collected at Precision National Plating Services, Inc., Clarks Summit, Pennsylvania, facility and its vicinity since 1970. Samples were collected by PNPS, the Pennsylvania Department of Environmental Resources (currently the Pennsylvania Department of Environmental Protection (PADEP)), and the USEPA. The database contains data found in the files of PADEP, USEPA, and Precision.

ATSDR has developed health-based Comparison Values (CVs) which are chemical-specific concentrations used to help determine environmental contaminants of health concern. We use CVs and information contained in current research literature to determine contaminants that require further evaluation. Concentrations below CVs are not expected to result in health effects. However, exceeding of a CV does not necessarily imply that a health threat exists. Rather, it assists in identifying contaminants that require further investigation. These CVs include Reference Doses (RfDs), Environmental Media Evaluation Guides (RMEGs) and Cancer Risk Evaluation Guides (CREGs). RMEGs serve as direct comparison guides when evaluating the potential for a contaminant to cause noncancer health effects. CREGS serve as direct comparison guides for evaluating the potential for a contaminant to cause cancer. ATSDR CVs

will be utilized, when applicable, as we evaluate potential health effects following exposure to the following environmental media.

Residential Wells Near the Site (Groundwater)

Arcadis Geraghty & Miller Analytical Database Release 2.0 contains water quality information for various private wells near the site from approximately 1970 to 1997. Well water samples were collected at various points and times during this 27-year period.

In many of the wells, the concentration of chromium and other metals varies significantly from one sampling round to the next. This scenario makes it difficult to determine the dose of the contaminant that residents may have been exposed to. To err on the side of safety, PADOH and ATSDR calculated the amount of contaminant that the residents were exposed to based on the maximum concentration detected during the sampling time frame. This is a very conservative approach.

During 1970 through 1995, well water samples were obtained from residential wells (RW01-RW25) near the site (Figure 4). Samples were analyzed for metals. Metals (copper, nickel, zinc, lead, aluminum, iron, cadmium, manganese, mercury, barium, magnesium, molybdenum, titanium, total chromium, and hexavalent chromium) with maximum concentrations that were above detection limits and not estimated or otherwise qualified are illustrated in Tables 1 & 2. With the exception of chromium, nickel, and lead, all other metals were below health-based guidelines and will not be evaluated further in this document.

The maximum concentration of hexavalent chromium (2750 micrograms per liter (μg/L)) was detected in a hand dug residential well, RW-02A(1) (Figure 4). ATSDR has not developed a chronic MRL for hexavalent chromium. However, USEPA has developed a chronic oral RfD of 0.003 milligrams per kilogram per day (mg/Kg/day) for this chemical. This RfD was based on animals studies where animals were exposed to hexavalent chromium through drinking water at 25 milligrams per liter (mg/L). At this exposure level, no adverse health effects were observed. To derive the RfD, USEPA used an uncertainty factor of 300 and a modifying factor of 3. This is a very conservative approach and means that health effects are unlikely anywhere near the RfD of 0.003mg/Kg/day.

Based on the maximum concentration of hexavalent chromium (2750 μg/L) detected in RW-02A(1), if a person drank 2 liters of this contaminated water a day then the estimated daily exposure dose through ingestion is 0.079 mg/Kg/day. This estimated exposure dose is about 26 times higher than USEPA's oral RfD. If daily exposure to this maximum dose of 0.079 mg/Kg/day had continued (it did not) then it might have resulted in mild symptoms such as gastrointestinal tract irritation, abdominal discomfort, and diarrhea. Oral ulcers might also have occurred if children regularly drank water at this level. These health effects should have been mild, transient, and should have become nonexistent when exposure ceased. Since, exposure did not persist at this level and health effects are not expected. It is also unlikely that any current

health condition in the exposed residents exists as a result of past exposure to hexavalent chromium in water from this well.

Nickel and lead were found to be elevated in isolated sampling events. The maximum levels detected are reported on Table 2. It is important to note that the concentrations fluctuated from non-detect or below levels of health concern up to the maximum level indicated.

ATSDR has not developed a Minimal Risk Level (MRL) for nickel. MRLs address non-cancerous health effects. The estimated exposure dose for nickel through drinking water from RW-02A did not exceed USEPA's chronic oral RfD of 0.02 mg/Kg/day. Therefore, health effects as a result of exposure to nickel from drinking water from RW-02A are unlikely.

ATSDR has not developed a MRL for lead. The maximum concentrations of lead (20.2 μg/L to 70.5 μg/L) detected in single or limited sampling events (Table 2) for several different wells exceeded USEPA's Action Level of 15 μg/L. An Action Level is used by water authorities in determining when they need to intervene to assure water quality. Specifically, utilities must ensure that tap water does not exceed the appropriate action level in least 90% of the homes sampled. If tap water originating from a utility exceeds this limit then the utility must take steps to correct this problem. Utilities have no jurisdiction over private well water. However, we comment on the Action Level to show when utilities are required to take action.

Throughout the general population, exposure to lead has the potential to be a public health problem, particularly for the young child and fetus. The primary target organ for lead toxicity is the brain or central nervous system especially during early childhood.

There are many sources of lead in the environment. In the residential area near the Precision site, historical sources of lead probably included lead in paint, lead in soil from the use of leaded gasoline, lead in drinking water from lead-based solder used in the plumbing within homes, and other sources.

This maximum concentration of lead (70.5 μg/L) was detected in the first draw (with no flushing of the lines) at the tap. The lead decreased to 5.7 μg/L after 30 seconds. This suggests that in RW-18, the lead is came from the home's plumbing and it is likely that as the family drew water, the levels consistently decreased to concentrations that would be more acceptable from a public health perspective. While the occasional lead exceedences above USEPA's action level contribute a small amount to overall body burden, we do not believe that exposure by children and others to lead in the residences was likely to result in health effects because the exposures were for a limited period of time.

Residential Wells within a One-Mile Radius of the Site

Ninety one (91) private residential wells, two businesses, and a church within an approximately 1-mile radius of the site were evaluated by PADOH and ATSDR to determine if chromium was

present in the water at levels that could harm people's health (Figure 5). The samples were obtained from February 2, 1999, through March 3, 1999. Our findings and rationale for analyzing the sampling for total and hexavalent chromium in these wells were reported in HC #7 [7].

Total chromium (likely trivalent) was detected in 11 of the 91 residential wells. The concentration of total chromium ranged from 6.8 micrograms per liter (μg/L) to 11.5 μg/L in 10 of the wells. The maximum concentration of total chromium (34.7 μg/L) was identified in a residential well immediately downgradient of the facility and in the area of the historic groundwater plume. Hexavalent chromium was not present above laboratory detection limits in any of these samples [12]. With the exception of one residential well (discussed in HC#7) containing 34.7 μg/L of total chromium, the concentrations in the residential wells were below levels of health concern and most likely represent background levels. Background levels may vary depending upon the geographic location however, one survey of U.S. tap drinking waters reported total chromium concentration that ranged from 0.4 μg/L to 8.0 μg/L [7].

An additional four (4) residential wells were subsequently sampled on June 16-17, 1999. Two (2) of these new wells were in Abington Township within the 1-mile radius and two (2) were in Glenburn Township located immediately outside of the 1-mile radius (Figure 5). The levels of total chromium and hexavalent chromium in the four residential wells were less than CVs, less than the laboratory detection limit (trace concentrations), and likely not present [7].
The private wells sampled outside the area of the plume are not hydrogeologically connected to the site (Figure 5). The area of the plume is identified in Figures 5,6. The levels of hexavalent chromium identified in the wells outside of the plume were estimated and essentially nonexistent [7] (Figure 5).

Chromium occurs primarily in the trivalent state, which is the most stable form, or in the hexavalent state (VI), which is a strong oxidizing agent [14]. Both acute and chronic toxicity of chromium are mainly caused by hexavalent compounds [15]. The levels of hexavalent chromium in the private wells sampled within the 1-mile radius of the site are estimated and essentially nonexistent. If present, the concentrations are so small that they would rapidly be reduced by body fluids into the trivalent form and are not likely to cause any health effects.

Although we do not have historic data on most of the wells within a 1-mile radius of the site that are outside of the groundwater plume that originated from the site, we do not believe that the historic levels of chromium were substantially different from those reported in HC #7. If chromium waste had been dumped offsite and contaminated the groundwater supplying these wells, it is likely that chromium would have been detected in the wells at higher levels during the 1999 sampling. Therefore, we believe that historic use of groundwater from the private wells that are outside of the plume did not harm the health of the people who used their well water. We classify the historic use of groundwater in these wells as representing no apparent health hazard.

Cinderblock & Bathtub Seeps:

Seeps known to be impacted by the site are discussed in HC #2 [2]. S-5 (Cinderblock) lies northwest of PNPS adjacent to the Ackerly Fairgrounds (Figure 6). Unfiltered hexavalent chromium was detected in this spring during May 1998 by PADEP at a concentration of 3350 μg/L and reported in PNPS HC#2. S-6 (an adjacent seep) was not sampled because of sampling difficulty, but due to its proximity to S-5, most likely was also contaminated. The level of chromium in these seeps has decreased over time. Historical concentrations of chromium in these seeps were higher than current levels detected by PADEP.

During our evaluation of potential historical exposure, one resident informed PADOH that she and a male companion were the "outdoor type" and they (as children) both drank a couple of handfuls of water from the seeps at least 2 times per day and up to 7 times per day 7 days a week [12].

Assessing the likelihood of adverse health effects occurring in individuals as a result of past exposure to chromium from the cinderblock and bathtub seeps is difficult because there is limited information available regarding historic concentrations of chromium in these seeps. Specifically, we have no water quality data for years before 1975 for the cinderblock seep. While PADOH recognizes that historically these seeps were likely to have, at times, been significantly contaminated with chromium, we cannot determine with certainty if that exposure could have had an impact on the health of nearby residents because we do not know the levels of chromium present in the water.

In evaluating available historic data, we considered the worst case scenario described previously. Specifically, we base our evaluation on the assumption that the children (35 Kg weight) drank from the seep 7 times each day (approximately 500 milliliters per day), 7 days a week for 32 weeks each year for ten (10) years. We believe that this is an exceptionally conservative assumption and we recognize that it does not take into account the seasonal times when the seeps were dry or the water was unobtainable. It also does not take into account other situations that would have prevented the children from aggressively ingesting the water from the seeps.

At the cinderblock seep, we do not know the concentrations of trivalent and hexavalent chromium present in the water during the years 1960 to 1975. We may be almost certain, however, that chromium contamination was higher during the period of active waste disposal into the lagoon. Since we already have a maximum hexavalent chromium value of 16,400 μg/L (January, 1983) that far exceeds the average reported levels, we have used that maximum concentration as the basis for our exposure dose determination. This is an exceptionally conservative approach because, in reality, the concentrations fluctuated erratically over time and there were also very low chromium levels present in the spring.

Long-term (chronic) oral hexavalent chromium exposure studies in animals through drinking water at a dose of 3.6 mg/Kg/day did not show any signs of hematological change, no hepatic or

renal effects, and no change in body weight [16]. In a cross-sectional epidemiology study conducted in 1965 of 155 villages in the Peoples Republic of China whose well water contained 20,000 μg/liter (0.57mg/Kg/day oral daily dose) of hexavalent chromium as a result of pollution from an alloy plant, associations were found between drinking the contaminated water and indigestion, abdominal pain, diarrhea, vomiting, and oral ulcers. Similar results were found in two (2) similar studies in other villages [16]. No other health effects were reported.

At the maximum hexavalent chromium concentration (16,400 μg/L) detected in the seep, using the assumptions described above, the estimated daily exposure oral dose is 0.143 mg/Kg/day. ATSDR does not have a MRL for hexavalent chromium. This daily oral exposure dose is approximately forty eight (48) times higher than USEPA's RfD of 0.003 mg/Kg/day. However, the above epidemiological studies reported the aforementioned health effects at an oral daily dose of 0.57 mg/Kg/day which is about 4 times higher than the estimated exposure dose for the people at this site. Continued daily exposure to 0.143 mg/Kg/day might have resulted in gastrointestinal tract irritation, abdominal discomfort, and diarrhea. Oral ulcers might also have occurred in the children who reportedly aggressively drank from the seep at this level. These health effects should have been transient and should have disappeared when exposure ceased. Therefore, for these children past exposure would be classified as a public health hazard. It is unlikely that any current health condition in the exposed children exists as a result of past exposure to hexavalent chromium in this seep.

Perhaps a more typical exposure scenario for children who enjoy playing in wooded areas would be that they drank a couple of handfuls of water from the seeps once or twice a month during the months of June through August when temperatures are the warmest and school is not in session (6 times per season) for 4 years.

At the estimated average hexavalent chromium concentration of approximately 5,300 μg/L in the seep, using the assumptions just described, the estimated average daily exposure oral dose is 0.0005 mg/Kg/day. This daily oral exposure dose is approximately 6 times lower than USEPA's RfD of 0.003 mg/Kg/day. Based on this more likely scenario, exposure to water in the seeps would not threaten the health of children occasionally drinking from them and does not represent a past public health hazard.

Restaurant Seeps:

There are three seeps (S-1, S-2 & S-3) that lie west of the site on a nearby restaurant property (Figure 6). S-1 and S-2 feed a pond on this property.

Unfiltered hexavalent chromium was detected in S-1 at a concentration of 13.0 μg/L on May 7, 1998, by PADEP and reported in PNPS HC #2 [2]. S-2 and S-3 were not sampled during this sampling event, but they are also contaminated. The concentration of hexavalent chromium in S-1 was below USEPA's Maximum Contaminant Level (MCL) for drinking water and could simply represent "background" conditions for groundwater or it could suggest a source of contamination

topographically upgradient of the spring. The area upgradient of S-2 is a hill south of the site which has not been previously identified to PADOH as a confirmed contaminant source area (Figure 7). Whatever the source of chromium at this property, we are led to conclude that only shallow groundwater (within 150 feet of the surface) is affected. Four-to-five foot high semicircular rock casings house S-1 and S-2 where surface water from the seeps enters the pond. It is unlikely that children or others trespassed on the property and either scaled the rock enclosures or entered the springs from the pond to attempt to drink the surface water as it entered the pond. S-3 soaks the ground adjacent to the seep, however, it does not generate enough surface water flow to represent a significant exposure point. We do not believe routine historic exposure to surface water from any of the seeps on this property routinely occurred and, therefore, do not believe they represent a past public health threat.

Restaurant Pond:

In April 1978, hexavalent chromium was detected and reported in "the pond" at a concentration of 3,500 μg/L and declined over the next three months to less than 10 μg/L [17]. About a year later, in March 1979, hexavalent chromium reached 900 μg/L and within three months was again below 10 μg/L. We believe the sampling points for "the pond" were actually water entering the pond from the pond seeps. Soil cover is shallow on the hill topographically upgradient of the pond and it is possible that, historically, any chromium waste spilled or deposited there could move rapidly through exposed rock fractures to discharge points below. Such a physical setting may explain the spiking that is reported in the data collected in the late 1970's. We do not know where the samples were extracted from the pond, but there were times when chromium contamination was higher than it is today. Routine topical exposure to water containing 3500 μg/L of hexavalent chromium may cause transient mild allergic dermatitis in very hypersensitive individuals. However, we do not believe routine historic exposure to surface water from any of the areas on this property occurred and therefore do not believe they represent a past public health threat.

Old Murphy Seep:

One seep (S-7) lies north of the site, east of Ackerly Road, along the base of the railroad tracks on the old Murphy property (Figure 7). On May 26, 1999, ThermoRetec, a consultant for Precision National Corporation, sampled S-7 and found neither total chromium or hexavalent chromium [18]. Considering the local topography and the recharge area for the spring, we do not believe it is hydrogeologically connected to the site and was not impacted by the site in the past [19].

Surface Water (Ackerly Creek):

Chromium and hexavalent chromium were detected in the Ackerly Creek and reported in ThermoRetec's May 9, 2000, draft Ecological Risk Assessment for the Precision National Plating Services, Incorporated Site at maximum concentrations of 112 μg/L and 120 μg/L, respectively.

Topical exposure to these levels while wading in the creek is not likely to affect the recreator's health and does not pose a health threat.

We do not know maximum levels of chromium that may have historically entered Ackerly Creek. However, assuming children were exposed for an extended length of time (which did not occur because of concentration fluctuations) to the maximum level (16,400 μg/L) of hexavalent chromium detected in the seeps and that the water entered Ackerly Creek, very hypersensitive individuals may have developed a mild, transient, dermatitis. Although historical concentrations in the surface water of the creek may have been higher than current levels, we do not believe that children would have consistently been exposed to the maximum levels because the concentrations of hexavalent chromium fluctuated greatly in the seeps and would be rapidly diluted upon entering the creek. We believe that past exposure to surface water in the Ackerly Creek represents no apparent health hazard to children or adults who may have recreated in the creek.

Soil (Golf Course):

On July 12, 2000, PADEP sampled surface soil (0-3") at five (5) locations (S1-5) on the grounds of the golf course at the Glen Oak Country Club (Figure 8). The sampling included two (2) background samples (S4,5) on both sides of State Route 4010 near a pond just prior to the intersection of SR 4010 and Route 407. These areas were sampled in response to community concern to determine if hexavalent chromium had migrated off the PNPS in air and deposited in the soil at the golf course. In addition to chromium, the soil samples were analyzed for lead, arsenic, and antimony [20].

Hexavalent chromium was reported below the detection limit of 1.0 mg/Kg in all golf course and background samples. The maximum concentration of total chromium (predominantly trivalent) was detected at 29.9 mg/Kg in S-1. Lead was detected on the golf course at a maximum concentration of 45.3 mg/Kg in S-1. The lead was detected in background sample S-4 at 84.2 mg/Kg. The maximum concentration of arsenic was detected at 9.6 mg/Kg in S-1. Arsenic was also detected in background sample S-4 at a maximum concentration of 9.6 mg/Kg. The maximum concentration of antimony was detected in S-1 at less than 4.4 mg/Kg. Antimony was also detected in background sample S-5 at a maximum concentration of less than 3.8 mg/Kg [20].

We have no evidence that hexavalent chromium migrated from the site to the golf course. However, if it had migrated to the golf course through the air, it all has been reduced to trivalent chromium and is not present in the surface soil at levels of health concern. With the exception of lead, the levels of metals detected in soil below the golf course greens are consistent with the levels detected in the background samples. The lead level of 84.2 mg/Kg in background soil sample S-4 is most likely due to its close proximity to the road and from leaded gasoline. Significant exposure to golf course soils beneath the greens is unlikely during normal recreational activities. The levels of metals present in soil at the golf course are also below

health-based guidelines and do not pose a health threat to golfers, maintenance workers, or others at the golf course.

Air near the Site:

Hexavalent chromium is recognized by the International Agency for Research on Cancer (IARC) and by the U.S. Department of Health and Human Services (USDHHS) as a human carcinogen [21]. The increased risk of cancer occurs through inhalation and affects primarily the lung. Although individual studies suggest the possibility of an excess incidence of cancer at sites outside the lung, the results from these studies are inconsistent [21]. Further, studies have shown that the available evidence indicates that hexavalent chromium is changed (reduced) in body fluids and tissues to the trivalent form which is less toxic [22]. Animal studies have not shown trivalent chromium to be carcinogenic by ingestion [23]. Therefore, even in the respiratory tract which is the only consistent target of hexavalent chromium carcinogenicity in humans, there are barriers hampering its carcinogenicity [22]. These hurdles could be overwhelmed only under conditions of massive exposure by inhalation [22].

Assessing the likelihood of adverse health effects occurring in individuals from past exposure to hexavalent chromium from the site in off-site air is difficult because there is limited information available regarding historic releases of contaminants, production processes, and past production rates. However, residents have reported occasions of seeing 'green snow'. This suggests that there could have been exposures to airborne contaminants [24].

We do not know the exact concentration of hexavalent chromium that might have been present in historic air releases. If people were chronically exposed to hexavalent chromium, we would be most concerned about an increase in the rate of lung cancer. We did not find an increased rate of cancer in this community (see discussion in the Health Outcome Data section.)

While we believe it is likely that residents were exposed to airborne contaminants, the levels would be quickly diluted during transport through the air. Because of limited historic information we cannot conclusively state that health effects did not occur. However, based on these assumptions we suspect that this past exposure did not harm the health of nearby residents and we classify the exposure pathway as no apparent public health hazard.

HEALTH OUTCOME DATA EVALUATION

During our May 6, 2000 public meeting, the community requested that PADOH evaluate the possibility that there was an increased incidence of adverse health outcomes near the site. In order to be responsive to community concerns, PADOH reviewed all available health outcome data. Each type of health outcome data and our conclusions are discussed as follows. In some instances, we identify where there is insufficient information to draw conclusions.

Non-induced fetal deaths (Miscarriages)

The Commonwealth of Pennsylvania does not have a miscarriage registry. There is very limited miscarriage information on the death certificates, and Precision site specific data are almost nonexistent. In 1997, 0.9% of the pregnancies in Pennsylvania reported non-induced fetal deaths (miscarriages) on the death certificates. In Pennsylvania, fetal death is legally defined as the expulsion or extraction from its mother of a product of conception after 16 weeks gestation and this product of conception does not show evidence of life after such expulsion or extraction. In comparison, the non-induced fetal death rate in U.S. is approximately 15% reported by the National Center for Health Statistics. It is apparent that there is a very large number of fetal deaths (probably in excess of 90 percent) not reported in Pennsylvania, mainly due to the exclusion of those fetal deaths less than 16 weeks gestation and a smaller undercount at later gestational ages. Due to the quality of the miscarriage data, we are unable to determine conclusively or with reasonable accuracy and confidence if an area of concern has experienced excess miscarriages by cause or by chance. In addition, there is no risk factor information on the death certificates that identifies what may have contributed to these miscarriages. Risk factors including genetics, maternal health, prenatal care, family medical history, social economic status, life style, occupational hazards or past exposure to harmful chemicals can significantly affect the pregnancy outcomes.

Congenital Anomalies (Birth Defects)

The State of Pennsylvania does not have a birth defect registry. There is very limited birth defect information on the birth certificates and Precision site specific data are almost nonexistent. In 1997, 1.9% of all live births in Pennsylvania reported a congenital anomaly (birth defect) on the birth certificates. In comparison, according to Centers for Disease Control and Prevention (CDC), approximately 3.0% of all live births in U.S. reported a congenital anomaly. It is apparent that a large number of the congenital anomalies are under-reported, especially for defects that are not easily diagnosed at the time of birth (e.g., certain heart defects). Due to the quality of the birth defect data, we are unable to determine conclusively or with reasonable accuracy and confidence whether an area has experienced excess birth defects by cause or by chance. In addition, there is no risk factor information on the birth certificates that identify what may have contributed to these birth defects. Risk factors including genetics, maternal health, prenatal care, family medical history, social economic status, life style, occupational hazards or past exposure to harmful chemicals, can significantly affect the pregnancy outcomes.

Cancer Mortality and Cancer Incidence

The State of Pennsylvania maintains cancer mortality and cancer registry (cancer incidence) data. Cancer incidence data have been available since 1985, and a complete cancer mortality data have been available since 1980. Because there is a limited historic environmental data available, it is difficult to determine decisively a potential exposed population. Based on the available groundwater, soil and sediment sampling data as well as the available information on

predominant wind direction and census tracts, we conclude, using very conservative assumptions, that the selected area in Figure 9 was probably affected most by the site in the past. We also assume that if the selected area of concern does not have an elevated rate of cancer, it is unlikely that other areas will have an elevated rate of cancer that is related to exposure to site-related chemicals.

Approximately 354 residents lived in the selected area based on the 1990 U.S. population census data. Considering the latency period of cancer development (20 to 30 years) and when the cancer data first became available, 19 years of cancer mortality data (1980-1998) and 13 years of cancer incidence data (1985-1997) were selected for review.

For cancer mortality, thirteen (13) cancer deaths were identified from the mortality database in the selected area during the 19 years. The number of the cancer deaths in a population of this size for 19 years was not abnormal. In addition, all cancer deaths occurred in the age groups in which the observed types of cancers are common. The median age of the deceased was 70 years of age which was comparable to the Glenburn and Abington townships.

Occupational exposure to hexavalent chromium compounds in a number of industries has been associated with increased risk of respiratory system cancers, primarily bronchogenic and nasal. As a result, IARC, USDHHS, and USEPA have classified hexavalent chromium as a human carcinogen, based on this inhalation pathway. There is currently no strong epidemiologic evidence to support a causal link between hexavalent chromium and stomach cancer. However, to be as conservative as possible, we decided to include in our review not only lung cancers (which are clearly associated with inhalation exposures to hexavalent chromium in a weight-of-evidence review of many occupational epidemiology studies) but also any stomach cancers (which are only anecdotally associated with oral exposures to hexavalent chromium in three studies). Only four cases of lung and stomach cancer (total) were reported for the 19 years in the selected area. These cases represent three lung cancer cases and one stomach cancer case. It was not possible for this analysis to specify the particular types of lung cancer cases or the type of stomach cancer found in the selected area. Regardless, this is a very small number of cases and may have occurred by chance. In addition, the occurrence of lung and stomach cancer may not be due to exposure to the site contaminants but other factors (i.e., smoking, diet, genetics, etc.). The other nine cancer deaths consisted of eight different types of cancer which are not known to be associated with chromium, even anecdotally. Each type of cancer was also a very small number that may have occurred by chance.

For cancer incidence, there were four newly diagnosed cancer cases of three different types of cancer reported during the 13 years time period in the selected area. All cancer cases diagnosed were in the age groups in which the types of cancers are common. The median age at the time of diagnosis was 73 years of age which was comparable to the Glenburn and Abington townships. The types of cancer diagnosed are not known to be associated with chromium. Since the numbers were very small, they may have occurred by chance. No lung or stomach cancer incidences were reported during this time period.

In conclusion, although we cannot rule out the possibility that past exposure may have played a role in individuals with cancers if they have been exposed at a level of health concern, it did not appear that the cancer experience in the selected area as a whole was abnormal.

This cancer review is a descriptive review and has several limitations. First, this review is based on the assumptions that were set forth previously, including our selection of the estimated area of concern. Secondly, the cancer death and cancer incidence data report the residence in which the individual resided at the time of death or diagnosis. Information on migration, previous residence or length of residency, is not available in the database for review. Finally, this review does not establish a cause-effect relationship because we are not able to eliminate the confounding factors, that is, other important risk factors that can also contribute to the cancer development. We are unable to adjust the data (directly or indirectly) because census tract data was not characterized by age and gender.

Low Birth Weight

Birth weight information is reported on the birth certificates; however, only aggregated numbers at the township level are reported. Since the contamination area was largely located in Glenburn township, we selected Glenburn township for the rate calculation. Birth weight is a useful indicator of maternal health and is strongly associated with neonatal death, congenital malformations, developmental delays, and chromosomal abnormalities. Based on the site operation history, 1968-1982 was part of the time period the site presented the greatest exposure risk. During that 15-year time period, 12 cases of low birth weight were reported among 217 live births (5.5%) in Glenburn township. In comparison, the rate of low birth weight ranged from 3.3% to 5.6% in Lackawanna County and from 6.5% to 8.2% in Pennsylvania for the same time period. The lower or comparable prevalence rate of low birth weight in Glenburn township provides indirect evidence for the absence of elevated adverse birth outcomes. Even though we cannot rule out that certain children may be adversely affected if they have been exposed to chromium or other site contaminants at a level of health concern, there is no indication of a widespread low birth weight problem.

All-cause mortality

The State of Pennsylvania maintains all-cause mortality data reported on the death certificates. When people are exposed to a contaminant at a level of health concern, they may develop certain illnesses, but they may not necessarily die of these illnesses except in very rare occasions when exposure to a large dose has caused accidental or intentional deaths. Therefore, the mortality data are not useful for providing meaningful information on adverse health outcomes associated with exposure to the site contaminants. In addition, all causes of deaths were reported including chronic diseases, communicable diseases, as well as accidents, homicides and suicides, most of which are not associated with chemical exposure. It is very difficult to determine what causes of death may be associated with the exposure to a chemical and to what extent the exposure has contributed to the mortality. Therefore, an all-cause mortality rate can be misleading and is not

representative of the health outcomes from past exposure. If residents are concerned about a particular cause of death that they believe to be associated with exposure to the site contaminants, PADOH will do further research on that particular concern.

Blood Lead Data

According to the department's Childhood Lead Program, no community-wide blood lead screenings have been conducted by the department for the site area in the past. Pennsylvania requires the reporting by laboratories of elevated blood lead levels in children and adults to PADOH. Laboratories analyzing blood for lead in adults must be certified by the state, as well as by Occupational Safety and Health Administration (OSHA). The laboratories certified by the state to perform blood lead analysis are required to report levels of 15 micrograms or higher of lead per deciliter blood (μg/dL) or more for children under 6 and pregnant females, and levels of 25 μg/dL or more for children over age 6 and adults.

However, adverse health effects were reportedly observable at blood lead levels as low as 10 μg/dL in some studies. Therefore, if residents in the site area have a personal health concern regarding blood lead levels, PADOH would like to address these concerns individually.

COMMUNITY QUESTIONS AND ANSWERS

What other chemicals were present at the site that you would expect to have migrated off site and cause adverse health effects among community members?

Response: None.

At what level do you expect adverse health effects from chromium and specifically, what health effects would you expect to see?

Response: In order for a chemical to cause an effect, there has to be enough chemical present (concentration) and there has to be enough contact or exposure to the chemical (frequency and duration). Because of these factors and the unique characteristics of each individual (age, weight, health status, lifestyle, sex, allergies, and family history), we cannot give a single level for a chemical where we would expect to see effects. In one human study where hexavalent chromium was consumed in drinking water for up to several years, symptoms were associated with the ingestion of well water containing 20,000 μg/L. The symptoms that were associated with drinking the contaminated water were oral ulcer, diarrhea, abdominal pain, indigestion, and vomiting.

Except for possibly one residential well, we do not believe residents who lived near the Precision plant were exposed to hexavalent chromium at a level that would cause these symptoms. If these symptoms did occur, they would have stopped when ingestion of the well water was discontinued without any long-term health effects.

How much confidence do you have in conclusions considering that there is no water quality data on many residential wells for several years at a time?

Response: We are committed to protecting public health and have formed only conclusions that we were very confident. We based our conclusions on the data available and very conservative assumptions about possible exposures. When there is limited data, we report the assumptions we use in determining a potential threat to health. If we feel the lack of data is of such a magnitude that we cannot determine reasonable exposure scenarios, we classify the potential public health threat as indeterminate.

What environmental data did you review to draw your conclusions?

Response: We reviewed all the residential well data available, at this time. It includes samples collected by three agencies; the Pennsylvania Department of Environmental Protection, the USEPA, and Thermo-Retec (a contractor of Precision National Corporation) with samples collected in 20 years between 1970 through 1999. Residential well samples were analyzed for chromium during the following years: 1970, 1971, 1978, 1979, 1980, 1982, 1984, 1985, 1989, 1993, 1995, 1996, 1997, and 1998. Other chemicals were analyzed in residential well samples in these years: 1970, 1971, 1973, 1975, 1978, 1979, 1984, 1985, 1988, 1990, 1991, 1992, 1993, 1995, and 1998 (See Tables 1 and 2).

Residents are concerned about the number of their neighbors who are ill. How does this neighborhood compare with similar ones in Pennsylvania?

Response: Based on an analysis of available health outcome data, PADOH concludes that the number of cancer deaths in the community near the site is not greater than other similar communities in Pennsylvania and the deaths occurred in age groups in which the types of cancers observed are common. We are unable to determine if residents near the site experience an increased number of miscarriages or birth defects because of the lack of information on these conditions. But, birth weight, which is a good indicator of maternal and child health, was similar to other communities throughout the state. Based on the known concentrations of hexavalent chromium and other chemicals in private well water, we would not expect these chemicals to

cause cancer, miscarriage, or many other illnesses reported in the community near the site.

I live downgradient of the site. In 1992, antimony may have been detected in my residential well. Could this exposure to antimony have harmed my health?

In 1988, USEPA sampled 4 residential wells downgradient of the site along Arch Avenue. Antimony was not detected in any of the homes. In 1992, antimony was reported to be possibly present in a well in the same residential area previously sampled. However, the level (31.7 μg/L) was below the instrument detection limit of 60 μg/L and the quantitation may not have been accurate. Antimony was not detected in 10 other wells sampled at this time. In 1993, USEPA resampled the residential well that was believed to contain 31.7 μg/L of antimony. It was not detected in this residential well or in three others sampled at the same time. It appears that either antimony is not present in the residential wells or it is present below the detection limit. PADOH and ATSDR recommend that the homes along Arch Avenue be resampled for antimony (and other metals) using a laboratory method that permits lower detection limit quantification. We will evaluate the results of the sampling and determine their public health significance.

Are the fish in Glenburn Pond safe to eat?

Response: USEPA's ecological risk assessment is not finalized. PADOH will review additional data when it becomes available.

Do you have any information on other chromium sites in Pennsylvania and the U.S.?

Response: A recent query identified 1,590 sites in the United States with 50 in Pennsylvania where chromium was present. It is important to note that each site has a unique set of circumstances (route of exposure, dose and duration of exposure, individual characteristics of the person or people who are exposed) and caution must be used when comparing sites.

Information on chromium sites is searchable on the ATSDR webpage: *http://www.atsdr.cdc.gov* click on HazDat and search under chromium. This is ATSDR's scientific and administrative database developed to provide access to information on the release of hazardous substances from Superfund sites or from emergency events and on the effects of hazardous substances on the health of human populations.

Hazardous waste sites in Pennsylvania are under the purview of the PADEP or the US USEPA. The USEPA also keeps a list of superfund sites in Pennsylvania and the United States where chromium is a contaminant of concern. You can search their database on the Internet at: *http://www.epa.gov/superfund/sites/query/advquery*

Is the public water supply safe?

Response: Both public water supplies with wells in the area are safe. These public water supply wells do not draw water from the contaminated ground water plume. The PADEP is responsible for permitting and monitoring public water supplies under the Safe Drinking Water Act. Both public water supplies are in compliance with the Safe Drinking Water Act requirements. Under the Safe Drinking Water Act, all public water companies in Pennsylvania test for contaminants to ensure water quality and are mandated to report to their customers any contaminants which exceed the regulatory standards. They also are mandated to notify their customers if they exceed the standards. If you have any questions about the quality of your water you may contact your supplier for more information.

Is it safe to use the ballfields, located near the Ackerly Creek, for additional recreational activities?

Response: PADOH and ATSDR evaluated hexavalent chromium levels in soil/sediment samples obtained by PADEP at the Ackerly Fairgrounds and in the Ackerly Creek in HCs 3,4. We determined that exposure to this contaminant should not harm the health of people who recreate in these areas.

Is it safe for children or pets to wade in the Ackerly Creek?

Response: Yes. The results of our evaluation are reported in HC #4. PADOH and ATSDR reviewed sampling data on sediment from the Ackerly Creek. The levels of hexavalent chromium in the sediment of the creek are below levels of health concern. Because hexavalent chromium is not readily absorbed through the skin, occasional dermal (skin) contact to low levels of hexavalent chromium does not pose a health concern.

Is it safe to use the old wells to fill our swimming pools and water gardens?

Response: There does not appear to be a health concern if residents near the site use their well water to fill swimming pools or water gardens. However, if you choose to

use your well water for these purposes, you may contact the PADOH and we will review your water quality results for you. Most health agencies recommend testing private residential wells periodically regardless of their location. Recommended tests often include a yearly test for coliform bacteria, nitrate, pH, and total dissolved solids. In addition, testing every three years for sulfate, chloride, iron, manganese, hardness, and corrosion is often a general recommendation.

Is skin contact with the seeps safe?

Response: We do not expect to see any adverse health effects to occur from occasional dermal (skin) contact with the seeps. However, prolonged or frequent contact with water from the Cinderblock seep might cause a mild, transient, contact dermatitis (skin rash) in a very hypersensitive child. The rash would stop as soon as exposure ceased. In Health Consultation #2 PADOH and ATSDR recommended restricting access to significantly contaminated (Cinderblock) seeps. Access to the Cinderblock and adjacent seep is currently restricted by a fence.

Is there heavy metal contamination in the well water at the Tall Timbers mobile home park? If so, is it related to Precision site?

Response: Tall Timbers mobile home park is not in the groundwater plume of contamination. It is far from the site and not related hydrogeologically. Under the Clean Water Act the PADEP regulates public water supplies. PADOH reviewed water quality data submitted by Tall Timbers under the Clean Water Act for 1996 - 1998. All the chemicals at that time were below the regulatory standards and do not pose a health concern.

Did you review the study done by a Keystone College professor that found chromium in the Keystone Creek?

Response: PADOH could not identify a water body downstream of the Precision site named Keystone Creek. According to the Commonwealth of Pennsylvania's Pennsylvania Code Title 25. Environmental Protection, Department of Environmental Protection, Chapter 93. Water Quality Standards, the Ackerly Creek drains into the South Branch of the Tunkhannock Creek that drains into the Tunkhannock Creek and then the Susquehanna River. Contaminants from the Precision site drain into the Ackerly Creek. Generally, the further downstream from the site the samples are taken, the more diluted (less concentrated) the contaminants. PADOH reviewed a written report by a Keystone College student on the chromium contamination, the stream identified in that report was the Ackerly Creek.

Can you do a health study in our community?

Response: A health study is not currently planned or recommended at this site. Before a meaningful health study could be done, there first has to be evidence of exposures at levels that could possibly contribute to measurable health effects which in general, do not exist at this site. At the Precision site, chromium exposure information indicates that levels of exposure were quite low. Lower exposures result in lower health risks and lower health risks are always hardest to measure. For some pathways we don't have enough information to determine if people were exposed at levels of concern and, unfortunately, we do not have a biological test to determine past exposure to chromium.

Another difficulty is that there is not a large enough number of people near the precision site to do a meaningful health study. When a study is based on a small number of people, it becomes very difficult to measure health outcomes with sufficient statistical precision and to rule out "chance" as a possible explanation of the results.

Can you offer the medical visits to physicians who specialize in environmental medicine to everyone?

Response: The available data does not indicate an increased rate of illness in the community or that residents would, in general, have been exposed to chemicals at levels that would be expected to produce health effects. For these reasons, widespread medical testing of residents is not indicated. ATSDR offered to arrange for a second medical opinion from experts in environmental health medicine for a small, select group of residents who had hair analysis done for themselves. With regard to the chemicals present at this site, ATSDR and PADOH believe that hair analysis is of limited value in making health care decisions. ATSDR has provided funding to provide this small group of residents the option of a second medical opinion so that they can make the best possible personal health care choices. Physicians trained in environmental medicine and practicing at an Association of Occupational and Environmental Clinic (AOEC) will conduct these medical exams should this small group of residents decide to take advantage of this opportunity.

Are there any biological tests that determine past exposure to chromium?

Response: In general, biological tests provide limited information on past exposure to chromium. The results from hair analysis are often very difficult to interpret. Hair, blood, and urine samples are valid in some circumstances as indicators for current exposure to contaminants, but not useful for evaluating past exposure to chromium.

The American Medical Association's Committee on Cutaneous Health and Cosmetics has stated that, "The state of health of the body may be entirely unrelated to the physical and chemical condition of the hair." Although severe deficiency states of an essential element are often associated with low concentrations of the element in hair, there are not data that indicate that low concentrations of an element signify low tissue levels nor that high concentrations reflect high tissue stores. Therefore, hair metal levels would rarely help a physician select effective treatment. The AMA's policy statement states "The AMA opposes chemical analysis of the hair as a determinant of the need for medical therapy and supports informing the American public and appropriate governmental agencies of this unproven practice and its potential for health care fraud." PADOH and ATSDR plan to arrange for an expert on hair analysis and environmental exposures to speak with residents and doctors serving the community.

ATSDR and PADOH always recommend that individuals consult with their personal physicians regarding their health concerns. If additional expertise in environmental health medicine is necessary, ATSDR and PADOH are available to provide environmental health consultation to community members and their health care providers, information on clinics with expertise in environmental health exposures, and to discuss additional health concerns with individuals.

My residential water samples had many chemicals found at low levels and there were a few contaminants at levels exceeding the standards set by the USEPA under the Safe Drinking Water Act for public water supplies. Are there potential health effects from exposure to contaminants exceeding these standards?

Response: We have not found residential wells to contain chemicals other than chromium at levels of health concern. When evaluating the potential for adverse health effects from an exposure to a toxic substance, we evaluate the level, frequency, and duration of the exposure. The more consistently a toxicant is present and the greater the level (concentration), the more likely an adverse health effect will occur. Many health guidance values are based on lifetime exposure to a specific chemical.

It is not unusual to sporadically identify trace or low amounts of chemicals in residential well samples as a result of background levels found naturally in groundwater or as a result of household plumbing or laboratory practices. Therefore, when we evaluate the analytical data, we look at the data qualifiers and for repeated occurrences if a contaminant is present in trace amounts or at low levels.

ATSDR and PADOH base our assessments on a weight of evidence approach to the health issues at a specific site. These factors include the characteristics of the exposed population, the nature of the exposure, duration of exposure, scientific basis of health guidance values, and background levels found in the environment. If a contaminant level

exceeds USEPA's regulatory standards, it does not necessarily mean a health threat exists. In fact, because the standards are developed with conservative assumptions, exceeding the level for short periods of time is unlikely to present a threat to human health. Because the limit set for many chemicals is based on lifetime exposure, short-term low level exceedences pose an insignificant or limited risk for many potential contaminants. An exposure level exceeding these regulatory values merely indicates that further evaluation of the potentially exposed population may be indicated. Many chemicals occur naturally and sporadically throughout Pennsylvania and across the United States. We reviewed the data on other chemicals found in residential wells near the site and found them to be consistent with background levels found sporadically throughout the Commonwealth. We would not expect these chemicals at background levels to cause adverse health effects.

The HC does not address the facility's disposal practices (e.g. pumping to sewage, pumping out of the facility, blowing out contaminants) through the 1970s.

Response: The primary focus of the HC is the evaluation of known completed exposure pathways to determine the potential for exposure to contaminants to threaten the health of residents. We were informed by a representative from the Abington Township Maintenance Office that Precision National Plating Services, Inc. was at one time connected to a small sewage treatment facility along side Ackerly Creek, near the Golf Course and the railroad tracts. Residents expressed concern that chromium waste may have been released by the Precision facility to this sewage treatment facility and then the wastes may have entered the Ackerly Creek. We do not know what historically occurred at this sewage treatment facility. However, as previous discussed, we evaluated sediments in the Ackerly Creek for chromium and did not find that they posed a public health threat. Possible contaminants released into the septic system prior to connection with municipal sewage would have been picked up during our evaluation of the groundwater. Possible contaminants released into the Abington Township municipal sewage system in Waverly would not impact area residents. During early years of the operation of the Precision facility waste plating materials generated during the operation of the plant were stored in an on-site lagoon. Later, these material were transported offsite to treatment facilities. Contaminants vented into outside air and transported offsite in the air were addressed in the Discussion Section.

ATSDR and DOH are at worst conspiring to cover up information and at best not utilizing available information for their evaluation.

Response: DOH and ATSDR have reviewed the Administrative Record for this site, made many site visits, and have met publicly and privately with the residents on numerous occasions to gain all available information on the site. DOH and ATSDR have utilized all pertinent information that we deem appropriate and useful for evaluating any

potential for off-site contaminants to threaten the health of people exposed to them. To assure that all appropriate data was reviewed, we ask residents during town meetings to provide us with any information from their personal files or other sources that was not contained in the Administrative Record. Other than photographs depicting the green colored snow, we received none.

The Geraghty and Miller data base appears to be missing the 7/6/90 sample from the Gregus well, that according to a commentor reported 140 µg/L total chromium, 48 µg/L hexavalent chromium in the well, and then 131 µg/L total chromium at the tap, and 45 µg/L hexavalent chromium at the tap.

Response: These figures were reported in the Geraghty and Miller data base on 4/27/90 not 7/6/90. The correct amounts of total and hexavalent chromium at the well and tap follow: Unfiltered total chromium at the well is 140 µg/L. Unfiltered total chromium at the tap is 131 µg/L. Filtered chromium at the well is 45 µg/L and filtered chromium at the tap is 48 µg/L. Regardless of the date, these figures are not relevant to our evaluation of health risk because we used exposure scenarios where a substantial higher concentration of hexavalent chromium (2750 µg/L in the hand dug well) was present.

I think that the level of hexavalent chromium in monitoring well #4/production well is increasing over time but recognition of this is not occurring.

Response: Current levels (and fluctuations) of hexavalent chromium in monitoring wells do not have direct relevance to our health evaluation. In determining the potential threat to nearby residents, we used water sampling data from their private wells and from nearby springs where there was known exposure.

The 5/2/82 PA Insalaco letter states that "chrome levels raise the issue of airborne emissions as a problem," but the health consultation does not consider this statement.

Response: This issue was addressed in the section entitled, Air near the Site. As stated in this section, assessing the likelihood of adverse health effects occurring in individuals from past exposure to chromium from the site in off-site air is difficult because there is limited information available regarding historic releases of contaminants, production processes, and past production rates.

We do not know the exact concentration of hexavalent chromium that might have been present in historic air releases. If people were chronically exposed to hexavalent chromium, we would be most concerned about an increase in the rate of lung cancer. We

did not find an increased rate of cancer in this community (see discussion in the Health Outcome Data section.)

When is chelation therapy indicated and what risks are associated with this procedure?

Response: Chelation therapy is Federal Drug Administration (FDA) approved for the treatment of acute lead poisoning. Physicians, at their own discretion, have used chelation drugs to remove other metals. Initiating chelation therapy is a personal health decision between you and your medical provider. Chelation drugs bind with lead and deplete soft and skeletal tissues of lead, thus reducing its toxicity. Chelating agents have potential and often serious side effects and should only be considered when the benefits clearly outweigh the risks. Some chelation drugs are recommended only in life-threatening situations because of the potential irreversible harm to the patient's kidney and liver. In trying to reduce or eliminate health effects from lead, it is important to consider ways to reduce or eliminate exposure. PADOH does not recommend chelation therapy for unapproved indications.

Were former workers at the plant exposed to harmful levels of chromium?

Response: Occupational health issues are the responsibility of OSHA. For information on occupational exposure, at this site, you may contact OSHA's Wilkes-Barre Area Office at 20 North Pennsylvania Avenue, Penn Place, Room 2005, Wilkes-Barre, Pennsylvania, phone number: (570) 826-6538.

ATSDR requested documents from the Occupational Safety and Health Administration (OSHA)'s Wilkes Barre office. ATSDR reviewed these reports for indications of employee occupational exposures and for any information on the potential for offsite health effects while the facility was operating. OSHA inspected this facility on 3/24/81 - 6/5/81, 11/14/89 - 1/9/90, and 5/2/91 - 7/15/91. All three inspections were in response to employee complaints and included air monitoring inside the facility for chromium and chromic acid. No violations above occupational permissible exposure limits (PELs) for chromium and chromic acid were found in the onsite air monitoring events, although one violation was found for sodium hydroxide.

The 1981 complaint included concerns about (1) silica dust in the wet blaster area and employee shortness of breath in this area; (2) chromium emissions from the air grinding prepping area; (3) chromium emissions from the stripping tank area, and employees suffering from skin eruptions and bloody noses from the irritating dust; (4) emissions from the oven, and in the stick welding and degreasing tank areas; and (5) the claim that many employees ("over 50%") exhibited slight calcification in their x-rays who had normal results the previous year. After its inspection, OSHA fined the facility for several

violations including several fire safety hazards, a physical hazard from an unsecured gas cylinder, an electrical shock hazard, and a contact hazard for employees not wearing gloves when using toluene. No violations were found in the air monitoring conducted on site for toluene (less than 5 ppm in the air space of a painter working in the shipping and receiving area), chromium (Time Weighted Average (TWA) for a prepper/plater was 0.0065 mg/m3, and the OSHA PEL was 0.5 mg/m3), iron oxide (TWA for the prepper/plater was 0.019 mg/m3, and the PEL was 10.0 mg/m3), and chromic acid (TWA was 0.0092 mg/m3 for one chrome plater, non detect for another chrome plater, and 0.0035 mg/m3 for an unidentified worker, and the PEL was 0.1 mg/m3). The 1990 complaint included concerns about (1) plating in the crankshaft area being performed without tank covers; (2) poor ventilation in the copper welding area; (3) no welding blankets around the welding operation; (4) smoke in the lathe area that produces breathing problems for employees; (5) noise in the welding area, and metal shaving dust in the area; (5) an ergonomic hazard in the grinder area; and (6) a big duct with a dirty filter. After its inspection, OSHA fined the facility for several violations, including a hazard to employees from the welding flash and noise violations. Air monitoring was again conducted at the facility, and no violations were found. The levels of chromic acid were found to be 15% of the allowable limit in the plating area, and the levels of metals in the welding fume were greater than half of the allowable level (but still under the allowable level). The area where metal shavings were used was sampled for dust, and the levels were at 9% of the allowable level. The large air duct was examined, and found to be well maintained with no noticeable accumulations of dirt.

The 1991 complaint included concerns about (1) sodium hydroxide fumes from the old degreaser vat and fumes from the ultra-sonic cleaner vat; (2) fumes from the strip tank causing nose and throat irritation for employees; (3) inoperative scrubbers on the chrome plating tank, emitting fumes into the outside air without being cleaned and causing occasional eye, nose, and throat irritation for employees and possibly exposing homes nearby; and (4) sealed windows and inoperative roof venting causing overall poor indoor air circulation. After its inspection, OSHA fined the facility for several violations, including hazards to employees not wearing respirators in the ultrasonic cleaner tank area and not having eye flushing equipment in this area and in the chrome plating area, as well as for problems with the facility's hazard communication program and tank labeling. Air monitoring was again conducted at the facility. A violation was found for a cleaner operator in the ultrasonic cleaner tank area, who was exposed to sodium hydroxide at a ceiling value of 8.4 mg/m3 (~4.2x the ceiling limit of 2 mg/m3). No violations were found in the monitoring done for chromic acid (ceiling value was 0.060 mg/m3 for one chrome plater, and the PEL was 0.1 mg/m3).

CONCLUSIONS

The interpretation, advice, and recommendations provided in this HC are based on the data currently available. In addition, the conclusions and recommendations of this HC are specific to the Precision National Plating Site. They should not be considered applicable to any other situations.

Based on currently available information, PADOH and ATSDR conclude the following:

1. Past exposure to contaminated private well water, soil, sediment, and surface water in the Murphy Seep and in the Ackerly Creek did not threaten the health of people who came in contact with these media and represents no apparent public health hazard.

2. Routine historic exposure to surface water from any of the seeps on a nearby restaurant property was unlikely and therefore did not represent a past public health threat.

3. Exposure to soils on the golf course greens at the nearby Glen Oak Country Club do not pose a health threat to golfers, maintenance workers, or others using this facility.

4. Based on the limited data available, and the most likely exposure scenario, drinking water from Cinderblock seep is classified as no apparent health hazard for the general public. The exposure may have posed a health hazard for children who drank from the seep aggressively. These children may have experienced mild transient gastrointestinal irritation and discomfort that would have stopped when exposure ceased. It is unlikely that any current adverse health condition exists in exposed residents from past exposure to hexavalent chromium in the seep.

5. We are unable to determine, with certainty, if residents near the site could have experienced adverse health effects from past exposure to airborne contaminants from the facility. However, based on the dilution that occurs as hexavalent chromium is transported through ambient air and the absence of elevated lung cancer rates in the community, we suspect that this past exposure did not harm the health of nearby residents and classify the exposure pathway as no apparent public health hazard.

6. We are unable to determine if residents near the site experienced an increase in miscarriages and birth defects due to health outcome data limitations. However, based on known concentrations of contaminants in private well water, it is unlikely that these chemicals were responsible for any miscarriages that occurred in the community near the site.

7. The number of cancer deaths in the population near the site is not abnormally elevated and the deaths occurred in age groups in which the types of cancers observed are common.

* The category "No Apparent Public Health Hazard" is an ATSDR designation that in the case of the PNPS is used where human exposure to contaminated media may have occurred in the past, but the exposure is below a level of health hazard and not expected to cause any adverse health effects.

PUBLIC HEALTH RECOMMENDATIONS AND ACTIONS

Public Health Recommendations:

1. Re-sample residential wells along Arch Avenue for antimony. PADEP sampled these wells and PADOH will evaluate the public health significance of the sampling results and prepare a health consultation to address its findings.

2. Review USEPA's ecological risk assessment when finalized. PADOH will review this report and provide public health education to the residents if warranted.

Completed Public Health Actions:

1. PADOH arranged a meeting with the local medical society to provide physician and health care provider education about the health effects of chromium, a critical review of hair analysis in environmental medicine, and general information about the site during October 2000.

2. ATSDR arranged for reputable experts in the subject of hair analysis in clinical and environmental medicine to speak with the community at a public meeting in October 2000.

4. ATSDR arranged for a second medical opinion from experts in environmental health medicine for a select group of residents during June 2000. ATSDR arranged for a group of community members consisting of residents with health concerns who lived close to the site and have had their hair analyzed for chemicals they believed were in their body from past exposure to site-related environmental contamination. During January 2001, one resident took advantage of this opportunity and was examined by a physician trained in environmental medicine and practices at an Association of Occupational and Environmental Clinic.

5. PADOH met with many of the residents individually in their homes and at public meetings and provided public health education at this site numerous times during the preparation of the health consultations. PADOH also provided health information relating to the site to health professionals (pharmacists & school nurses) who may be contacted by the community for advice.

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17. Data package from Jack Kelly, Region III, ATSDR, to Robert M. Stroman, PADOH. December 19, 1997.

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19. Input from J.E. Godfrey, Hydrogeologist, PADOH, and John Mellow, Hydrogeologist, PADEP, July, 2000.

20. Data package from John S. Mellow, Hydrogeologist, PADEP, to Robert M. Stroman, Health Assessor. August 2000.

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CERTIFICATION

This Precision National Plating Services Site Health Consultation has been prepared by the Pennsylvania Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

Roberta Erlwein
Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings

Richard E. Gillig
Section Chief, SPS, SSAB, DHAC, ATSDR

FIGURES

Figure 1

Precision National Site Location Map

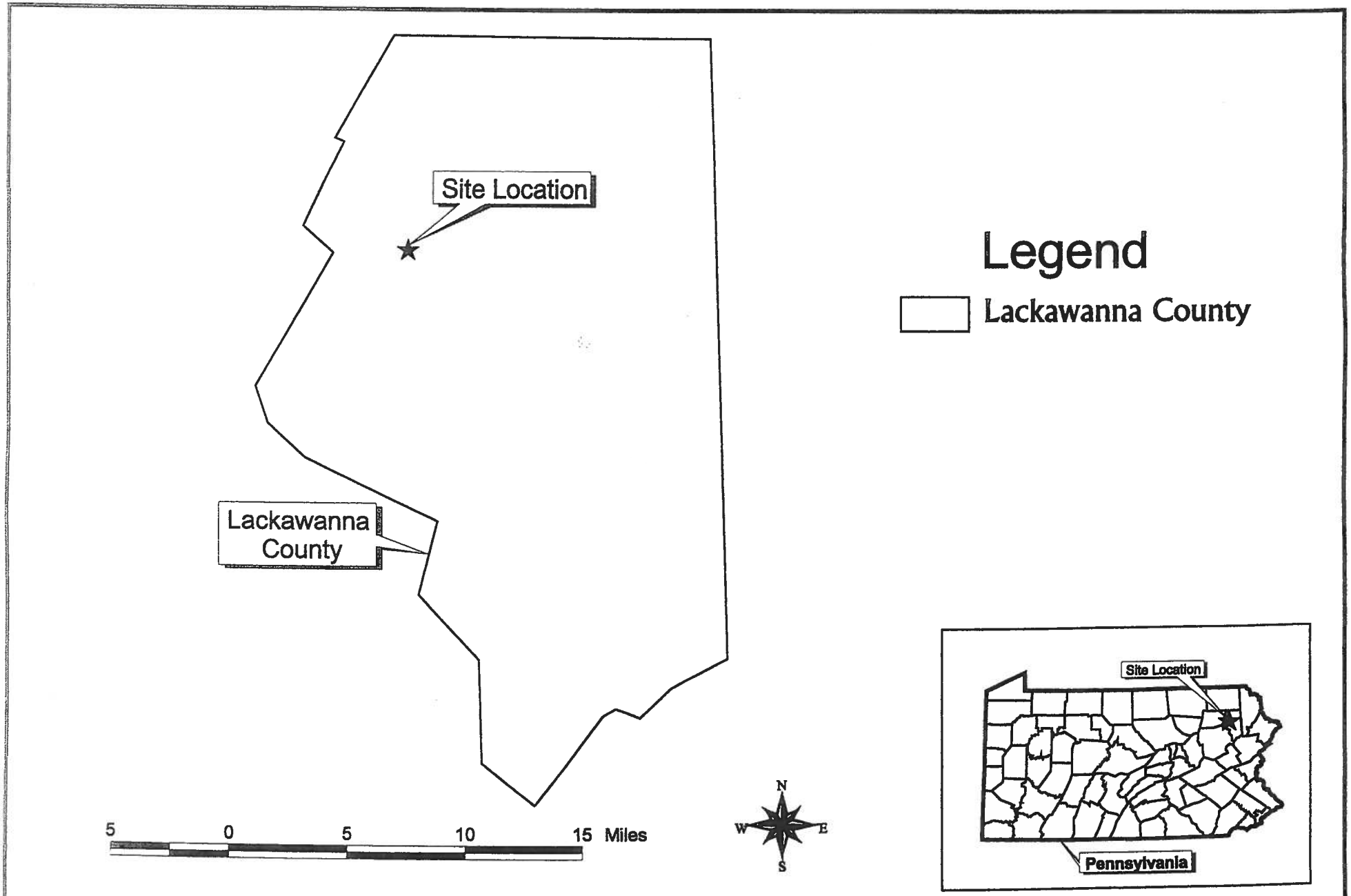


Figure 2

Precision National Site
Minor Civil Divisions & Selected Roads

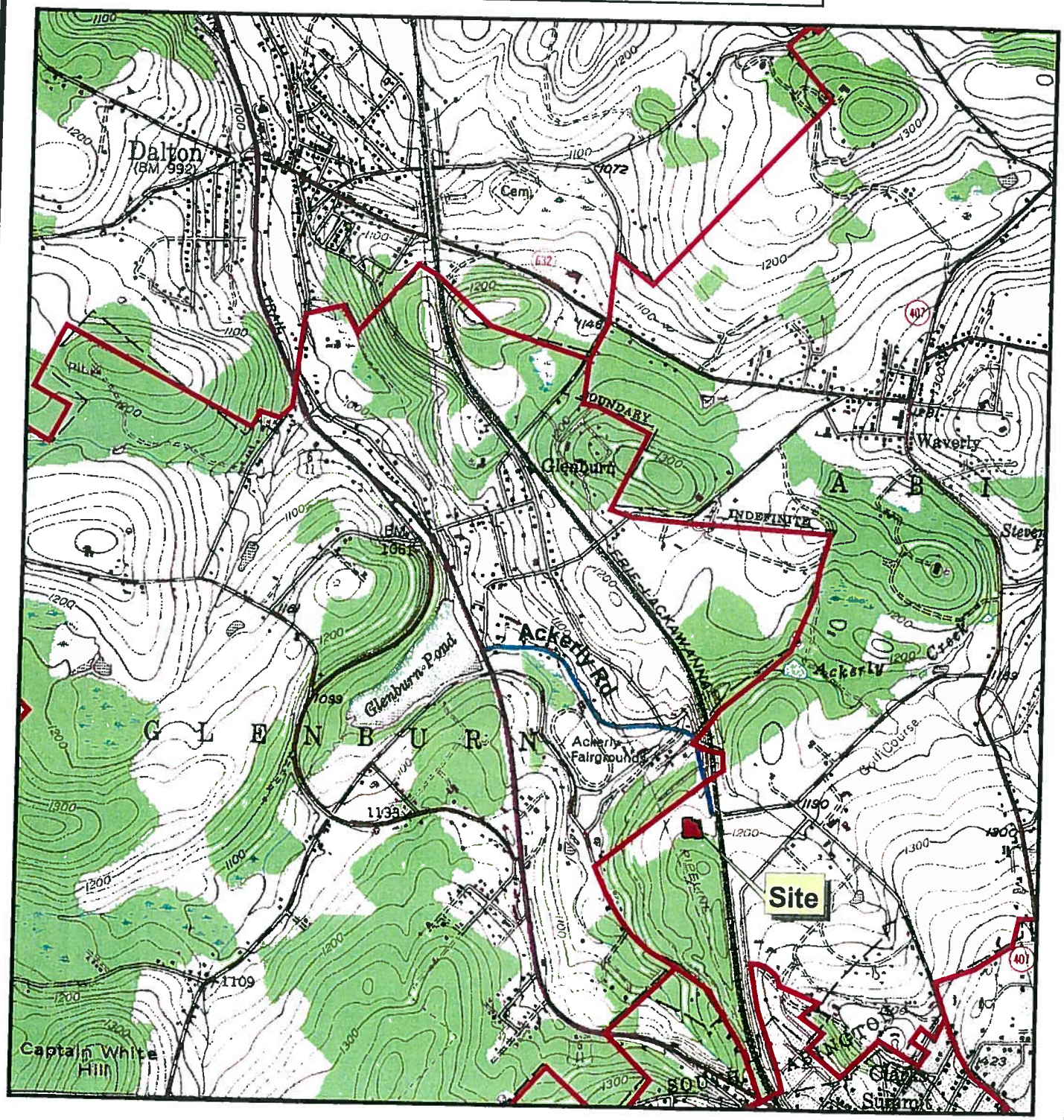


Figure 3

Precision National Groundwater Flow

(Arrows indicate direction of groundwater flow; dashed line shows possible underflow)

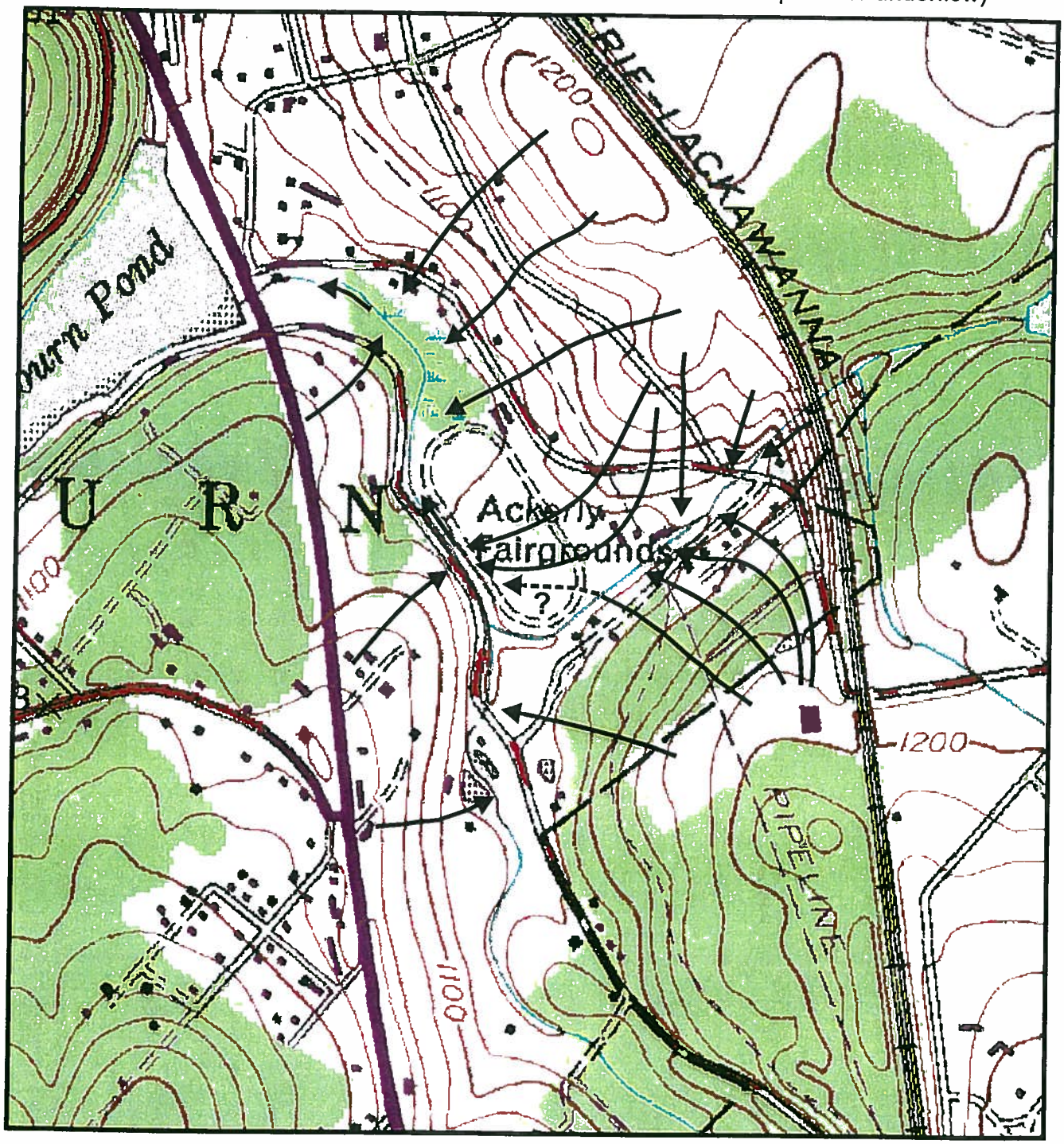


Figure 4

Precision National Site
Residential Wells

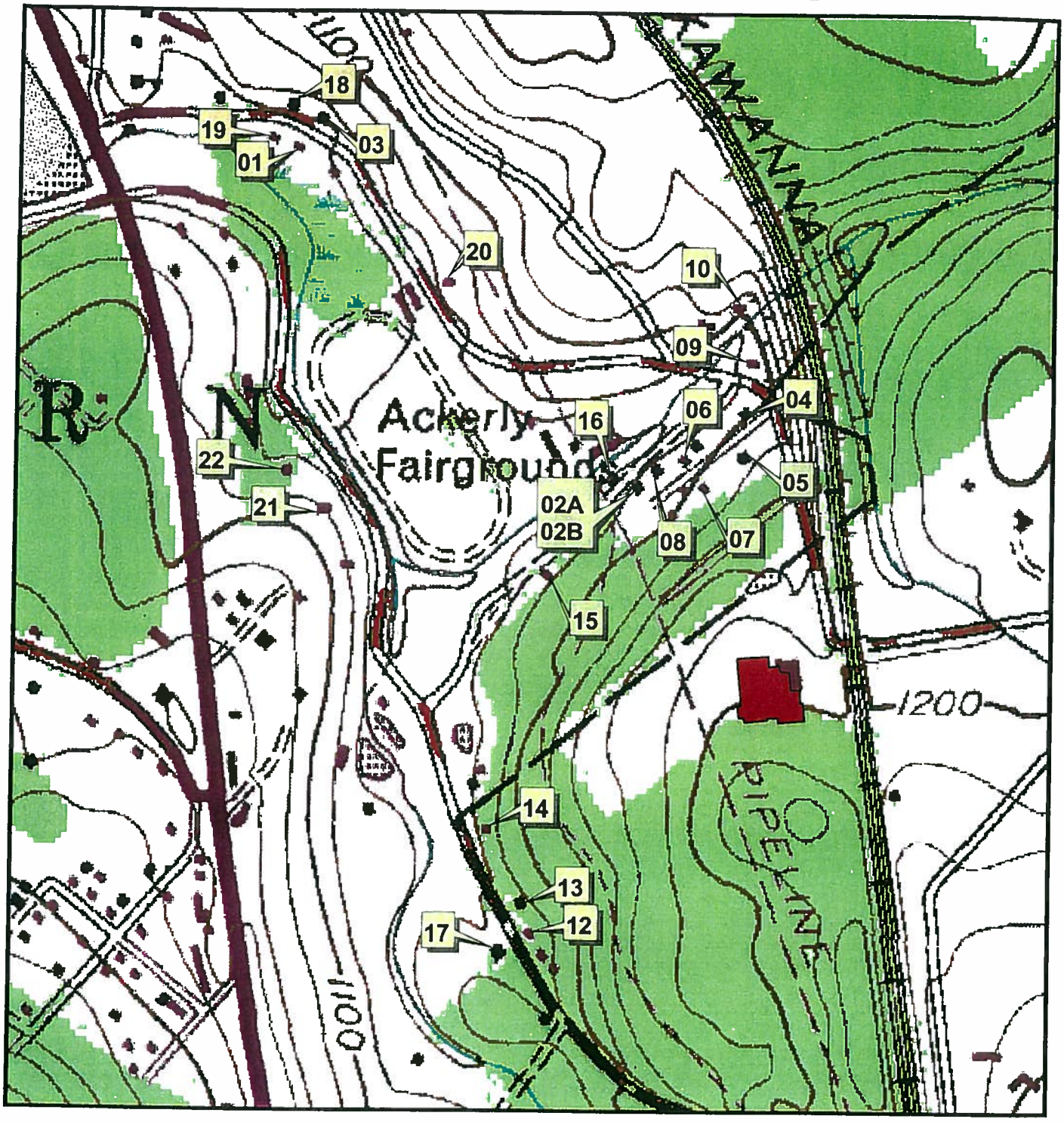


Figure 5

Precision National Site
Chromium Detection Levels in Wells

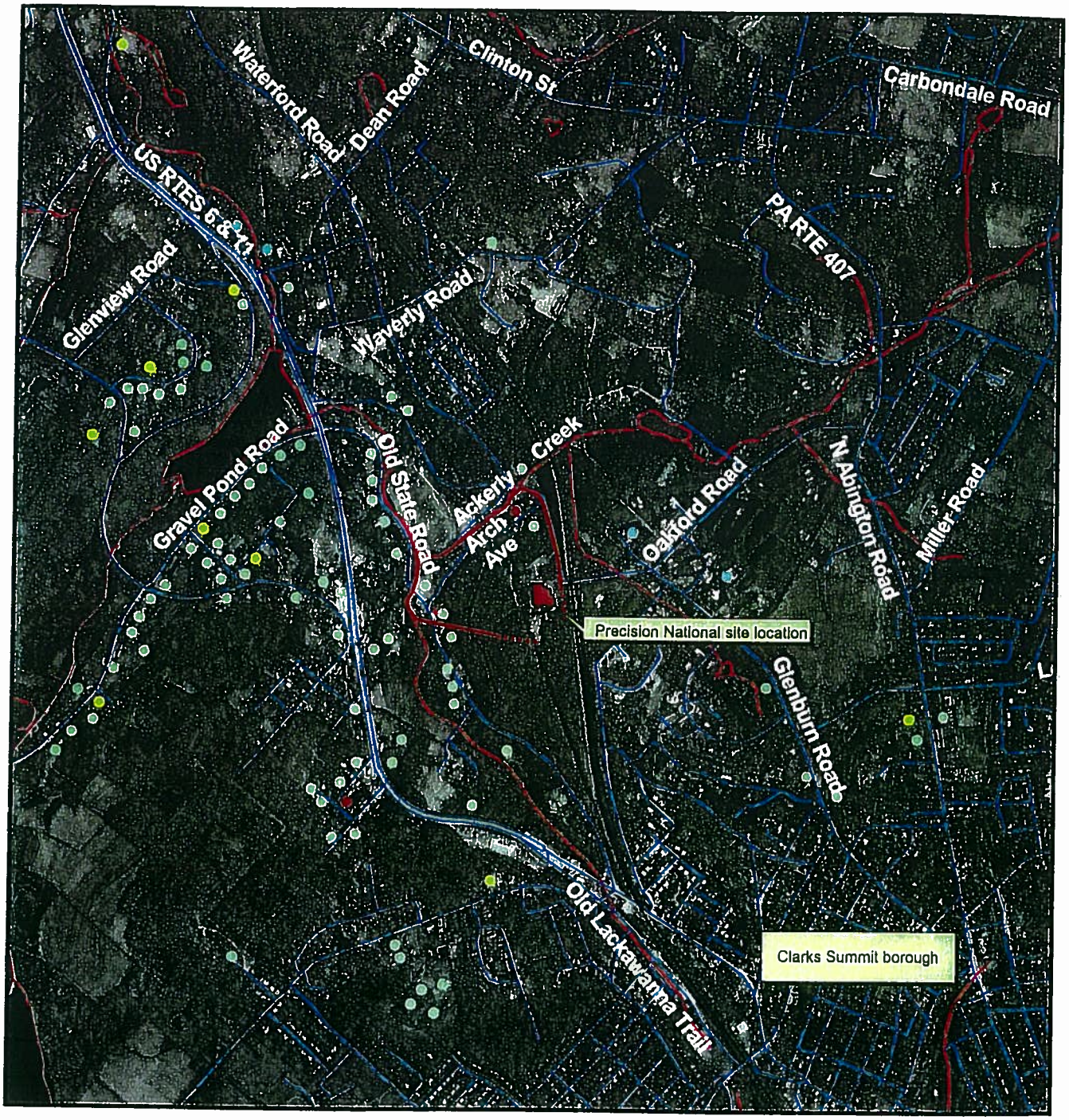
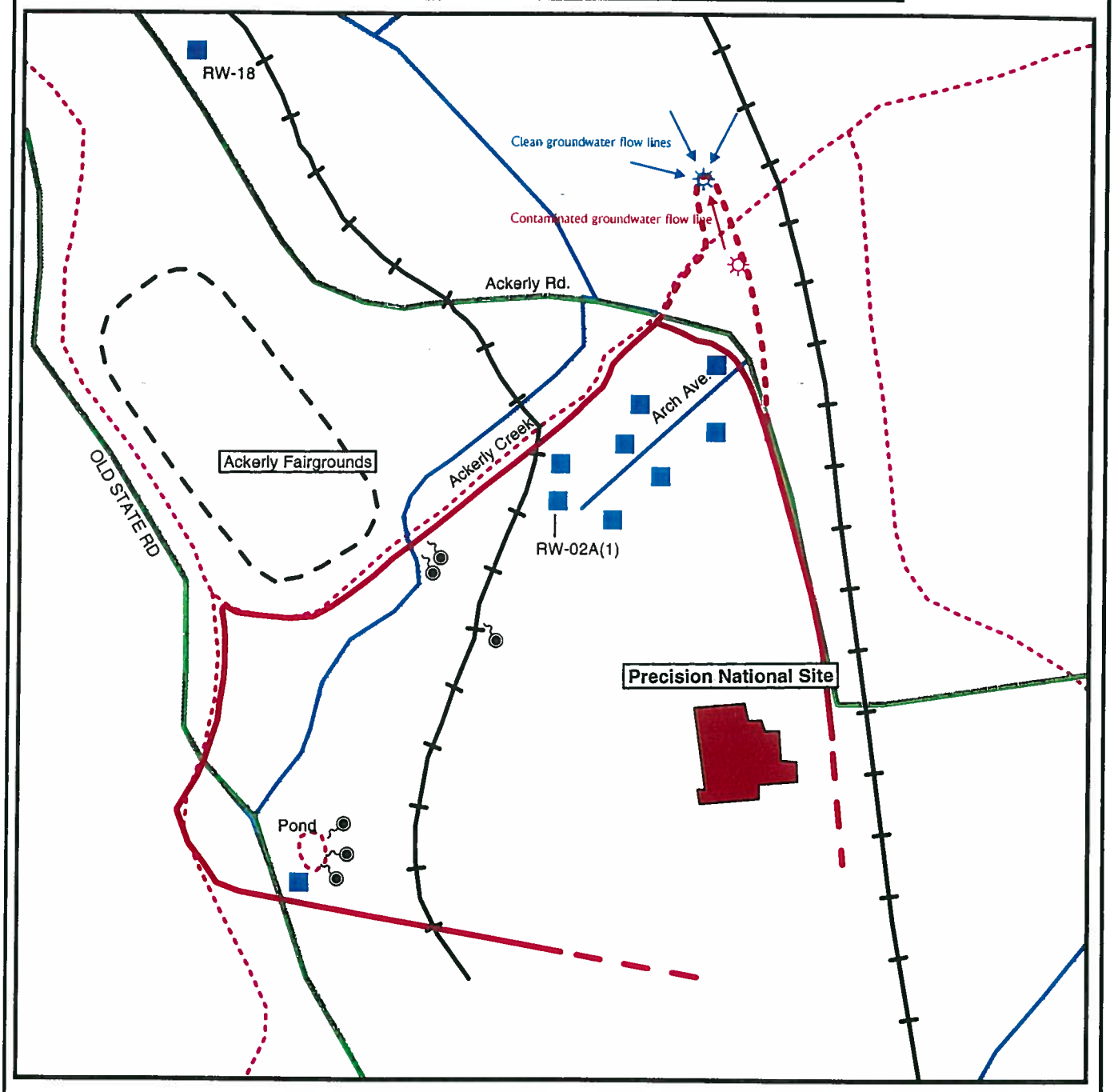
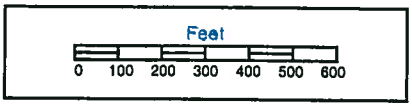


Figure 6

Precision National

Hexavalent Chromium Groundwater Contamination Plume Location





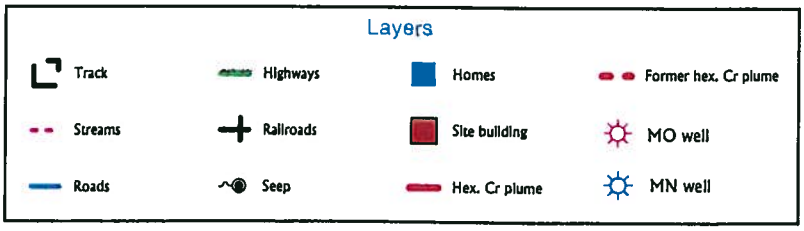


Figure 7

Precision National

Residential Wells, Public Wells, and Seeps

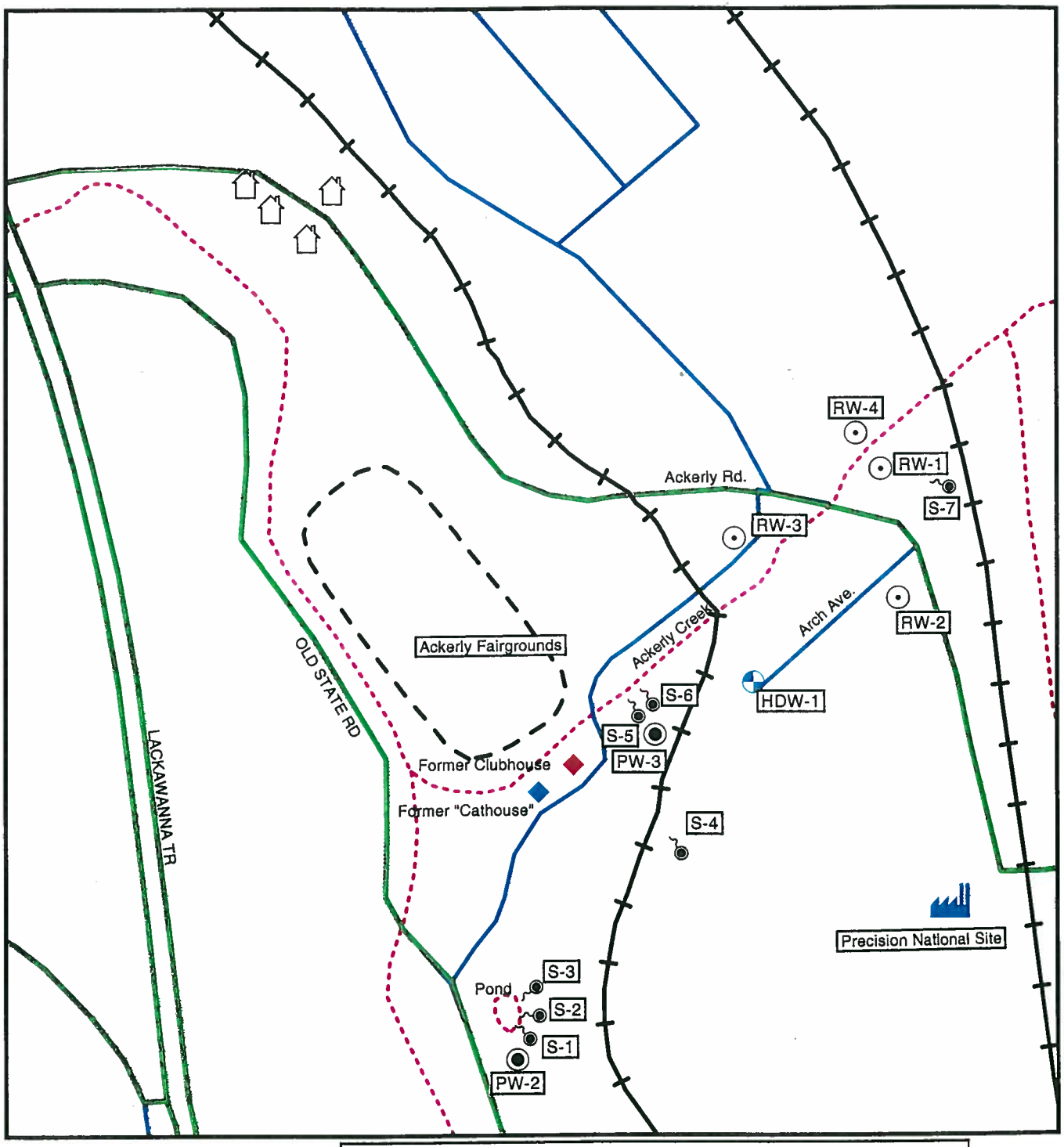


Figure 8

Precision National Site
Soil Samples at Golf Course

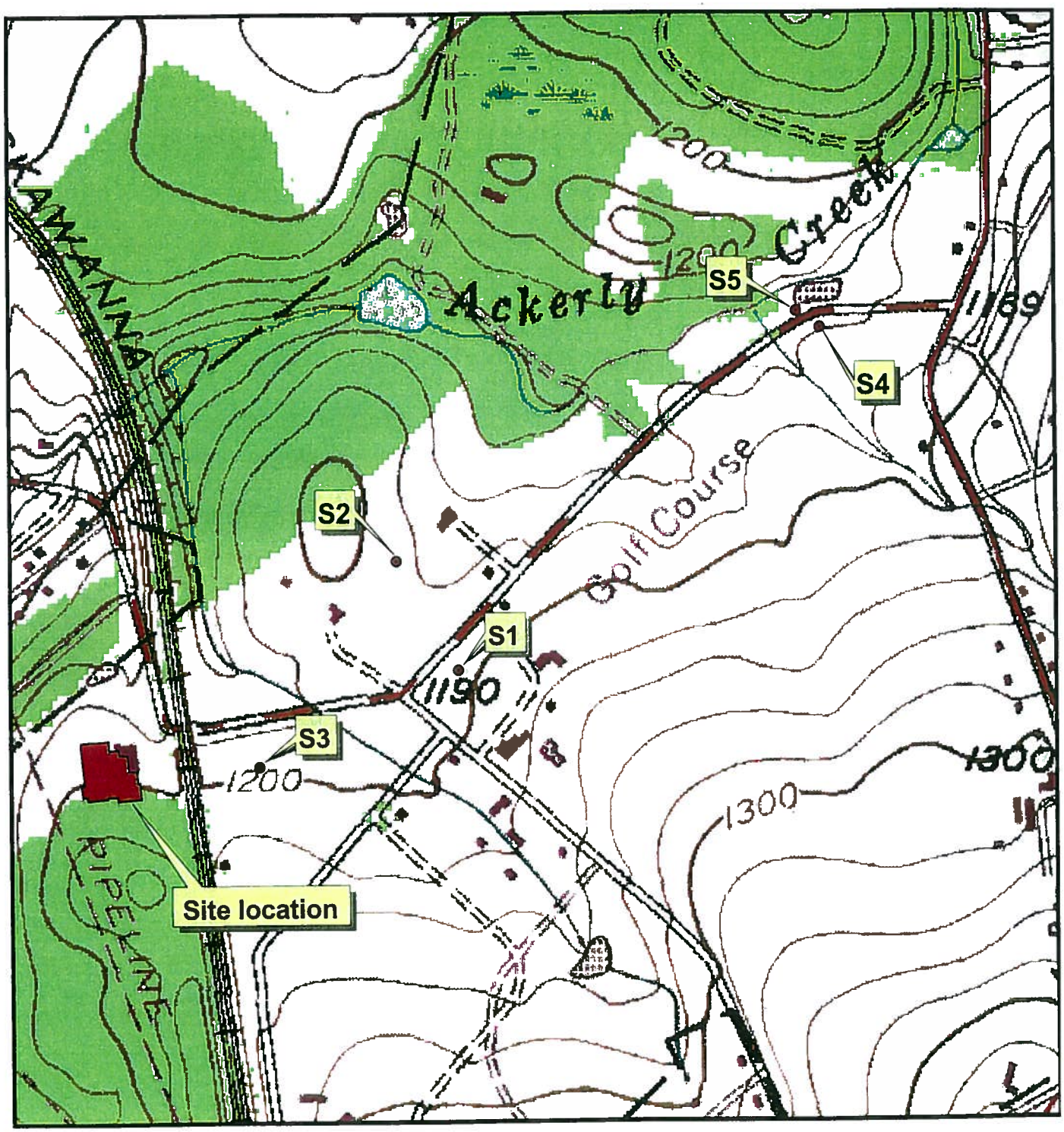
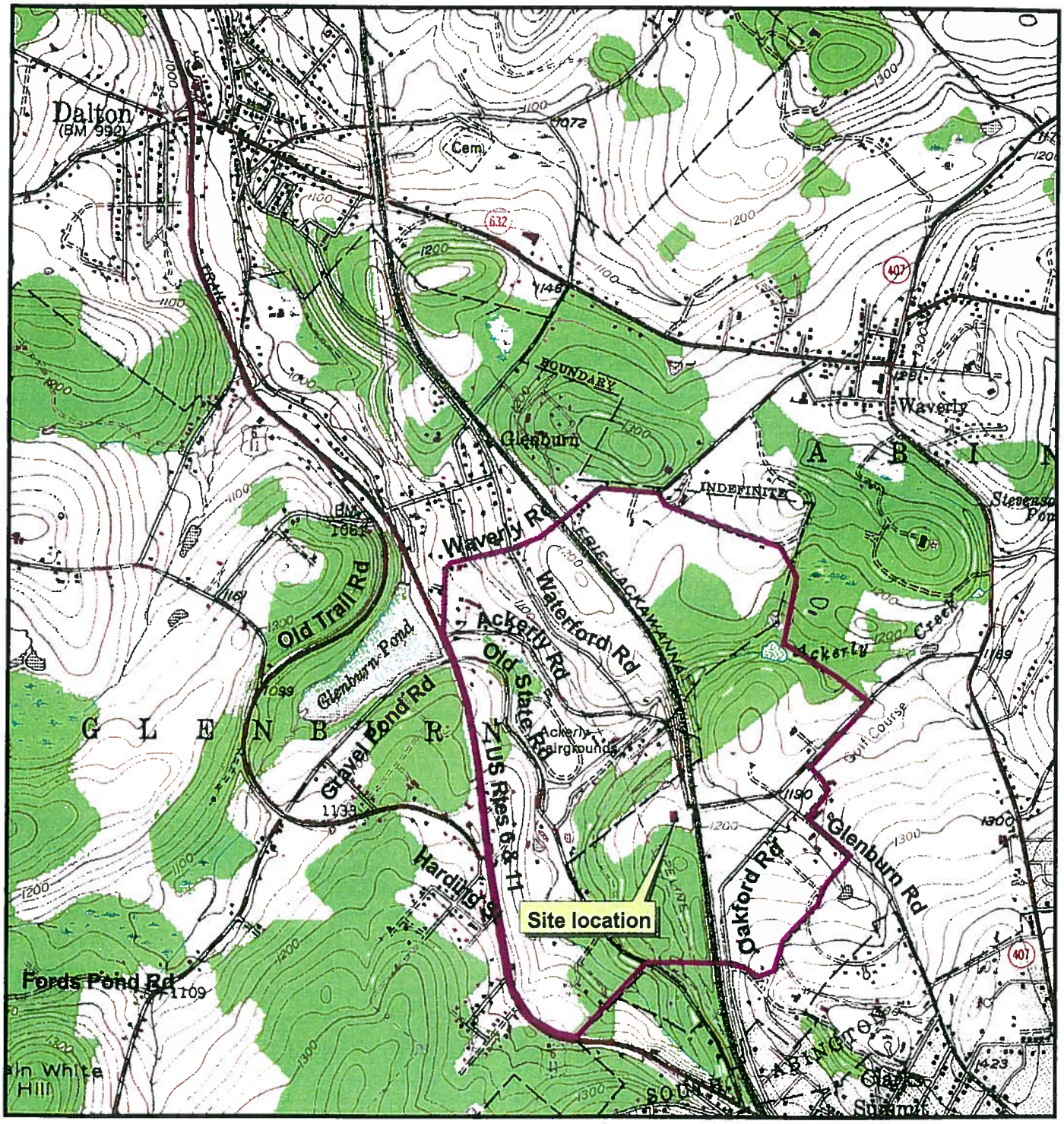


Figure 9

Precision National Site
Selected Area of Concern



TABLES

Table 1. Precision National Plating Services, Inc.
Chromium Concentrations in Residential Well Water Samples

Well I.D.	Sample Date	Bottled Water	City Water	Total Cr	Hexavalent Cr
RW-01	9/25/85		1997	0.051	0.047
	6/29-30/93			0.052	0.044
RW-02A(1)	9/15/70	1977		2.75	2.75
	10/29/70			3.1	2
RW-02A(2)	1/22/98	1977		1.17 J	0.922 J
RW-02B	6/29-30/93		1997	0.41	0.41
RW-03	10/16/89		1997	0.123	0.117
RW-O4	7/26/79			0.89	0.67
RW-05	5/25/95			0.0226	ND
RW-06	10/29/70	1977	1997	0.14	ND
RW-07	7/14/82	1977	1997	0.12	0.065
RW-08	10/24/78	1977	1997	0.31	0.3
	11/14/78			0.31	0.24
RW-09	7/12/71			2.05	1.2
RW-10	9/26/79			0.91	0.6
RW-11	3/27/80		1997	0.09	<0.01
RW-12	8/28/78			0.05	<0.01
RW-13	7/14/82			0.04	<0.01
RW-14	11/29/79			0.31	<0.01
RW-15	6/16/82			0.26	0.26
	7/26/93			1.71	1.9
RW-16	6/18/96*			0.00699	
RW-17	6/29-30/93			<0.05	<0.01
RW-18	2/8/84		1997	0.07	0.049
RW-19	4/17/84		1997	<0.01	<0.01
RW-20	9/24/85			<0.004	<0.01
RW-21	2/12/98			<0.01	<0.01
RW-22	2/12/98			<0.01	<0.01
RW-23	2/12/98			<0.01	<0.01
RW-24	1/13/88				
PW-1	4/19/78				<0.01
PW-2	5/31/97			<0.005	
Note: All Concentrations are in mg/L, which is equivalent to ppm.					
J = analyze present - reported value may not be accurate					
	or precise				
ND = none detected					

* new, unaerated

Table 2. Precision National Plating Services, Inc.
Element Concentrations in Residential Well Water Samples

Well ID	Sample Date	Bottled Water	City Water	Cu	Ni	Zn	Pb	Al	Fe	Cd	Mn	Hg	Ba	Mg	Mo	Tl
RW-01	4/17/84		1997				0.0044									
	10/10/84					0.23				0.0002						
RW-02A	7/2/70	1977			0.26											
	6/4/71			0.16												
	1/16/75					1.2										
RW-02A	1/22/98	1977		0.09		0.204+										
RW-02B	5/19-20/92		1997										0.249			
	7/26-29/93					0.054					0.031					
RW-03	12/3/85		1997	0.05					0.11							
	7/26-29/93					0.091		409								
RW-04	9/26/79			0.02	0.01	0.01										
RW-05	11/20/91					0.024					0.02		0.11			
RW-06	7/2/70		1997		0.15											
	6/4/71			0.12												
	7/12/71					0.26										
	1/17/78						0.05	0.04	0.02							
	4/27/90											0.0009**				
RW-07	9/26/79		1997	0.02	0.01											
RW-08	7/27/70		1997		0.11											
	6/4/71			0.18												
	5/19-20/92													8.33		
	1/13/88					0.03					0.025					
	4/27/90														0.007*	
	4/27/90														0.007**	
	5/19-20/92						0.0202									

Note: All concentrations are in mg/L, which is equivalent to ppm.

Cu = copper, Ni = nickel, Zn = zinc, Pb = lead, Al = aluminum, Fe = iron, Cd = cadmium, Mn = manganese, Hg = Mercury, Ba = barium
Mg = magnesium, Mo = molybdenum, Tl = thallium

* well
** tap
\+ filtered

Table 2. Precision National Plating Services, Inc.
Element Concentrations in Residential Well Water Samples

Well ID	Sample Date	Bottled Water	City Water	Cu	Ni	Zn	Pb	Al	Fe	Cd	Mn	Hg	Ba	Mg	Mo	Tl
RW-09	7/12/71			0.12		0.93										
RW-10	9/26/79			0.02												
	12/3/85							0.32	0.24							
RW-11	9/26/79		1997	0.03												
RW-12	4/24/78				0.04	0.05										
	9/26/79			0.02												
RW-13	9/26/79			0.01	0.02	0.01										
RW-14	9/26/79			0.03	0.01											
	2/12/98					0.0158										0.00688
RW-15	3/29/78			0.01		0.03	0.05		0.09							
	9/26/79				0.02											
	1/21/93												0.17			
RW-16	6/14/95								0.045		0.046					
RW-17	1/13/88			0.034J		0.032	0.0083B		0.353B				0.253			
RW-18	2/8/84		1997		0.14	0.13										
	10/10/84			0.38			0.0705									
RW-19	4/17/84		1997	0.17			0.0044									
RW-20	12/3/85					0.08		0.79	0.42		0.29					
RW-21	2/12/98			0.0203+		0.0284+										
RW-22	2/12/98			0.123		0.0322	0.0595									
RW-23	2/12/98			0.15		0.053										0.0023+
RW-24	1/13/88					0.09					0.025		0.395			
RW-25	3/14/73			0.02												

Note: All concentrations are in mg/L which is equivalent to ppm.

Cu = copper, Ni = nickel, Zn = zinc, Pb = lead, Al = aluminum, Fe = iron, Cd = Cadmium, Mn = manganese, Hg = mercury, Ba = barium
Mg = magnesium, Mo = molybdenum, Tl = Thallium
B = concentration between instrument detection limit and contract required detection limit
J = analyze present - reported value may not be accurate or precise

* well
** tap
+ filtered